

SUBJECT: Presentation to ML Staff Meeting  
of November 19, 1969 - CSM Vent  
Locations - ~~Case 620~~

DATE: December 1, 1969

FROM: J. J. Sakolosky

MEMORANDUM FOR FILE


  
In response to an action item from Mr. Schneider, the author presented the attached Vu-graphs at the ML staff meeting of November 19, 1969. The action consisted of determining the location of CSM vents with respect to the ATM for the current clocking configuration of the CSM to the MDA and for the case when the CSM is rotated 180° from its current position.

Figure 1 illustrates the current CM clocking with respect to the AAP Cluster. The +Z axis of the CSM is rotated clockwise through an angle of 45° from the -Z axis of the OA. This is close to an optimum orientation for directing fluids emitted from the CSM away from the ATM.

The CM contains three vents of interest - the water boiler vent, the urine dump and vacuum cleaner vent, and the waste water vent. These are all pointing approximately 180° away from the ATM with the present CSM clocking. The Service Module contains four vents - two pressure relief vents associated with the cryogenic gas storage system and two purge vents associated with the EPS/fuel cell system. In the current clocking configuration, fluid emitted from these vents is directed at an angle of approximately +90° from the -Z axis of the Cluster.

The relative location of these vents above the axial axis of the ATM is shown in Figure 2. The ATM centerline is located at SIVB STA 1985. The CM vents are located almost 200 inches above at SIVB STA 2170 and SIVB STA 2172. Fluids emitted from the CSM are discharged normal to the surface. Therefore, fluids dumped from the CM would be aimed directly down toward the ATM for certain clocking configurations. The SM vent axial locations and the axial location of the RCS Quads are also shown in Figure 2.

Figure 3 indicates the vent locations of the CSM with respect to the ATM when the CSM is rotated 180° from its present clocking configuration. In the new configuration all three CM vents are pointed directly at the ATM. The SM O<sub>2</sub> and H<sub>2</sub> pressure relief and purge vents are again pointed approximately +90° from the -Z axis of the Cluster.

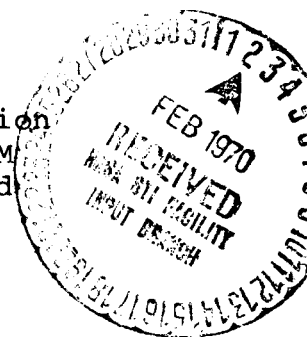
(NASA-CR-107816) PRESENTATION TO ML STAFF  
MEETING OF 19 NOVEMBER 1969 - CSM VENT  
LOCATIONS (Bellcomm, Inc.) 5 p

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The CM venting situation with the new clocking is not really as unfavorable as indicated by Figure 3. The CM water boiler vent (labeled ① in Figure 3) will not be used after docking to the Cluster. The urine dump and vacuum cleaner vent (labeled ② in Figure 3) is also not used after the CSM docks. The waste water vent is the critical one.

At the present time it is uncertain whether the fuel cells in the CSM will be shut down after docking to the Cluster or whether they will be operated at a reduced power level of approximately 1100 watts until either the cryogenic  $H_2$  or  $O_2^*$  is depleted. If the fuel cells are operated until depletion, then present plans call for dumping the water produced by the fuel cells from the CM waste water dump. This amounts to approximately 21 pounds of water per day for as long as 20 days. If the fuel cells are shut off after docking, then maximums of 50 lbs of  $H_2$  and 580 lbs of  $O_2$  could remain in the tanks. The  $H_2$  will be vented through the  $H_2$  pressure relief vent. The remaining  $O_2$  may be vented either to the space environment through the manual fuel cell purge vent or to the CM cabin through a yet-to-be installed automatic pressure relief valve.

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\*After the  $O_2$  tanks reach ambient temperature at full pressure, none of the remaining gaseous oxygen is to be used for any purpose until de-orbit; this trapped oxygen is the come-home supply.

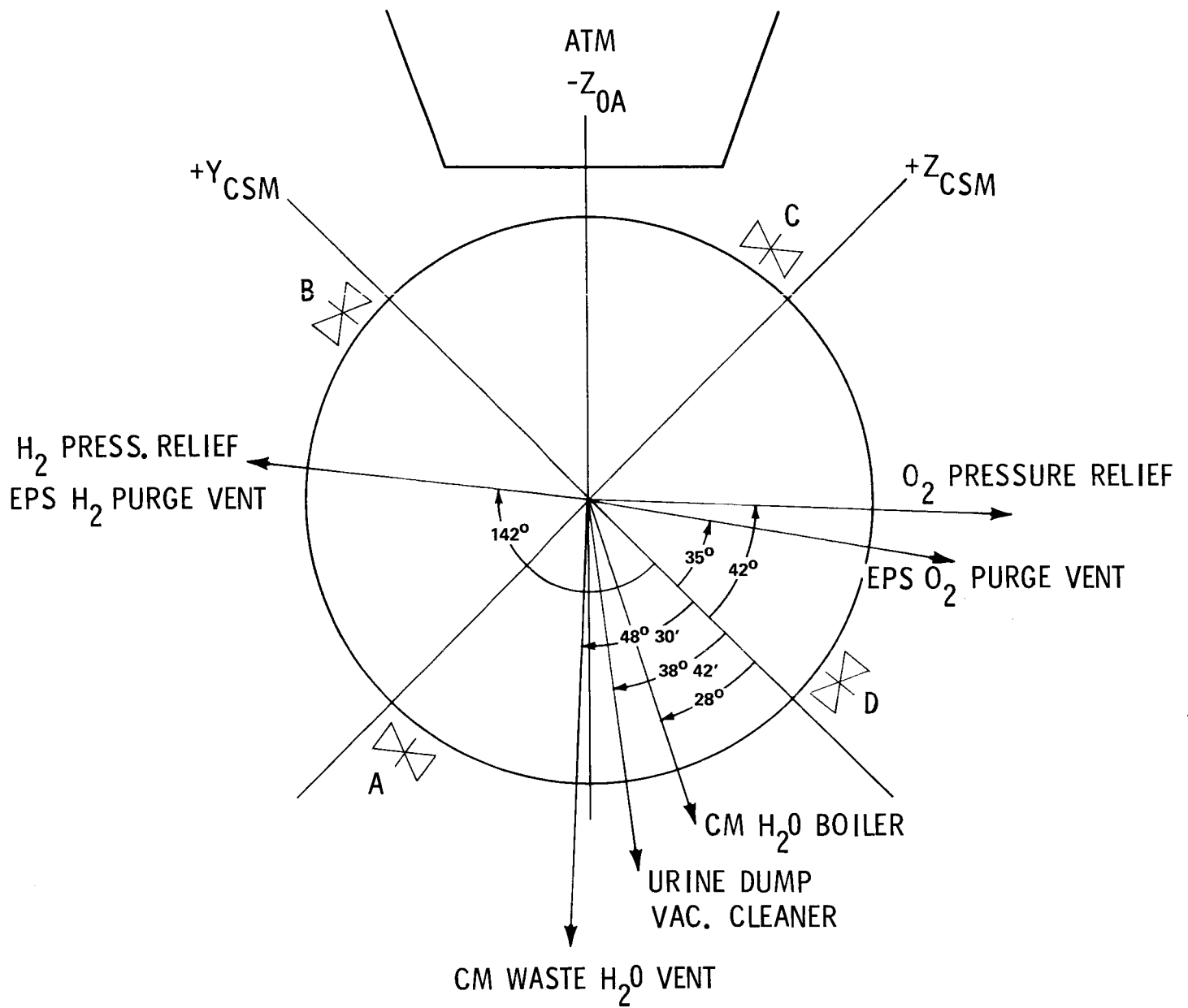


FIGURE 1 - CURRENT CSM/OA CLOCKING AS VIEWED FROM -X<sub>CSM</sub>

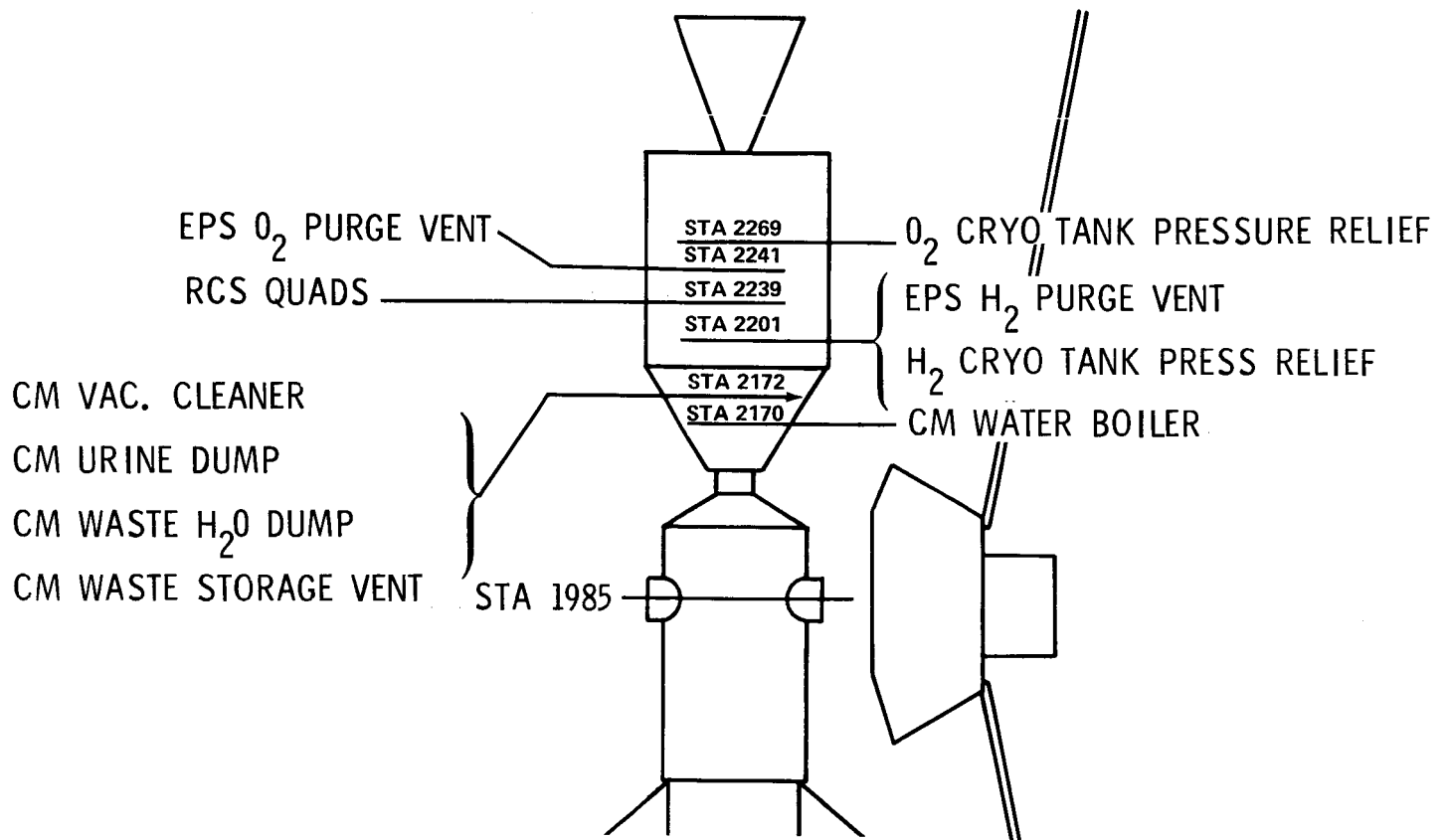


FIGURE 2 - CSM VENT STATION NUMBERS

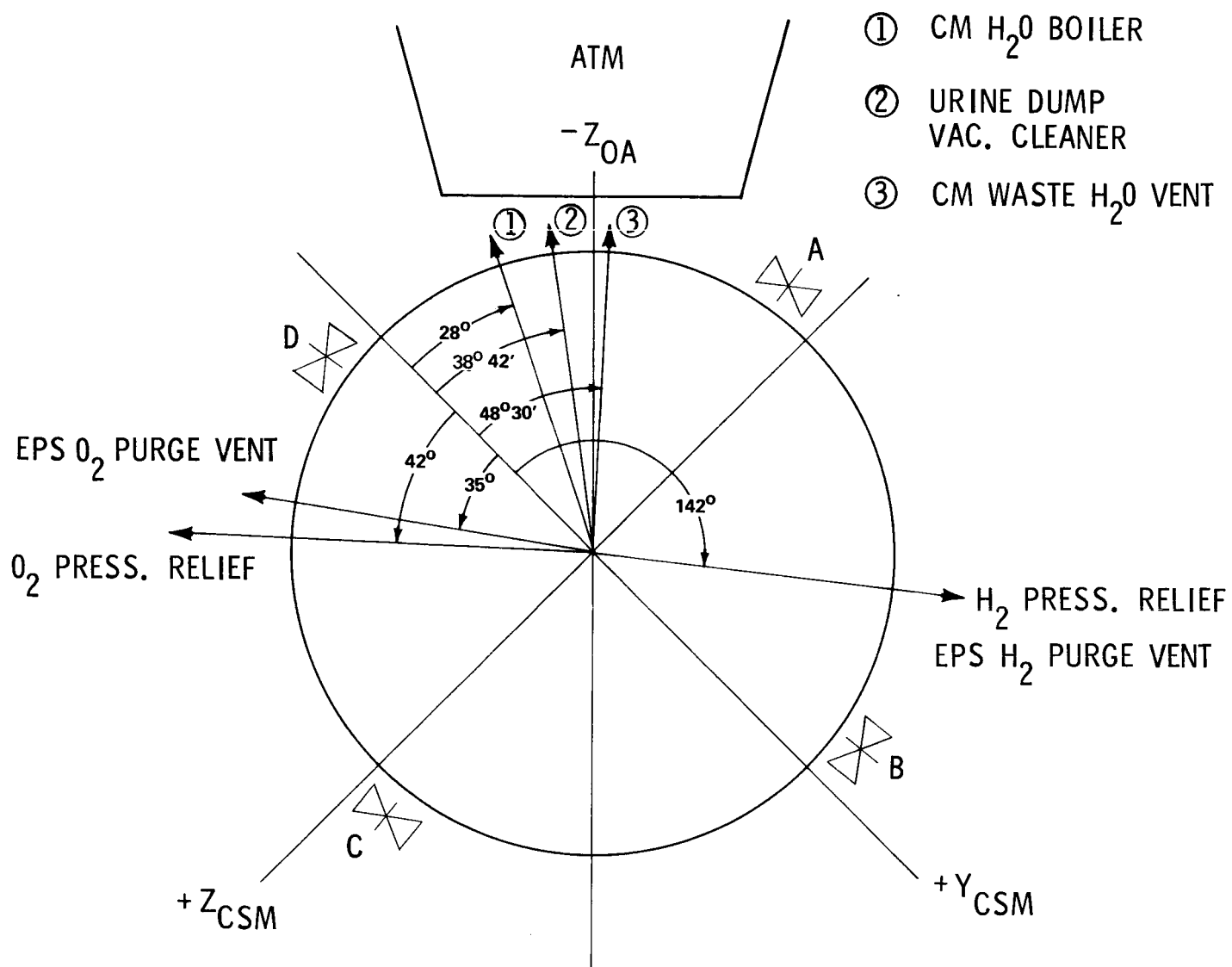


FIGURE 3 - CSM/OA CLOCKING ROTATED 180° FROM CURRENT CONFIG.  
AS VIEWED FROM  $-X_{CSM}$

BELLCOMM, INC.

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From: J. J. Sakolosky

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